

## CLAIMS

I claim:

- 1           1.    A laser system for destroying bacteria in a  
2   bacterial locale, said system comprising:
  - 3           (a)   a housing and a control;
  - 4           (b)   a laser oscillator sub-system within said housing  
5   for causing the selective emission under said control of  
6   first radiation in a first wavelength range of 865 nm to 875  
7   nm, and the selective emission under said control of second  
8   radiation at a second wavelength range of 925 nm to 935 nm;
  - 9           (c)   an optical channel for transmission of said first  
10   radiation and said second radiation from said laser  
11   oscillator sub-system; and
  - 12          (d)   a head for enabling delivery of said first  
13   radiation and said second radiation from said laser  
14   oscillator sub-system through said optical channel to the  
15   site of said bacterial locale;
  - 16          (e)   said first radiation and said second radiation  
17   being adapted to activate a chromophore from said bacterial  
18   locale and being adapted to cooperate with said chromophore  
19   to destroy bacteria in said bacterial locale.
- 1           2.    The laser system of claim 1 wherein said  
2   transmission is simultaneous.
- 1           3.    The laser system of claim 1 wherein said  
2   transmission is alternate.

1           4.    The laser system of claim 1 wherein said  
2 transmission is multiplexed.

1           5.    The laser system of claim 1 wherein said head  
2 includes an optical egress for said first radiation and said  
3 second radiation, and a scaling instrument.

1           6.    The laser system of claim 1 wherein said head  
2 includes an optical egress having a frosted tip.

1           7.    The laser system of claim 1 wherein said head  
2 includes an optical egress and an otoscope.

1           8.    The laser system of claim 1 wherein said head  
2 includes a digit clip and an optical egress therefrom.

1           9.    The laser system of claim 1 wherein said head  
2 includes a stocking having an optical ingress from said  
3 laser oscillator and an optical egress to the inner surface  
4 of said stocking.

1           10.   The laser system of claim 1 wherein said head  
2 includes a handle and an optical egress extending therefrom.

1           11.   A laser system for destroying bacteria in a  
2 bacterial locale, said system comprising:

3           (a)   a housing and a control;

1           (b)   a laser oscillator sub-system within said housing  
2 for causing the selective emission under said control of  
3 first radiation narrowly at a first wavelength of  
4 substantially 870 nm and the selective emission under said

5 control of second radiation at a second wavelength of  
6 substantially 930 nm;

7 (c) a head for delivering said first radiation and  
8 said second radiation from said laser oscillator sub-system  
9 to the site of said bacterial locale; and

10 (d) said first radiation and said second radiation  
11 being adapted to activate a chromophore from said bacterial  
12 locale and being adapted to cooperate with said chromophore  
13 to destroy bacteria in said bacterial locale.

1 12. The laser system of claim 11 wherein said  
2 transmission is simultaneous.

1 13. The laser system of claim 11 wherein said  
2 transmission is alternate.

1 14. The laser system of claim 11 wherein said  
2 transmission is multiplexed.

1 15. The laser system of claim 11 wherein said head  
2 includes an optical egress for said first radiation and said  
3 second radiation, and a scaling instrument.

1 16. The laser system of claim 11 wherein said head  
2 includes an optical egress having a frosted tip for  
3 insertion into a root canal.

1 17. The laser system of claim 11 wherein said head  
2 includes an optical egress and an otoscope.

1 18. The laser system of claim 11 wherein said head  
2 includes a digit clip and an optical egress therefrom.

1        19. The laser system of claim 11 wherein said head  
2 includes a stocking having an optical ingress from said  
3 laser oscillator and an optical egress to the inner surface  
4 of said stocking.

1        20. The laser system of claim 11 wherein said head  
2 includes a handle and an optical egress extending therefrom.

1        21. A process for destroying bacteria in a bacterial  
2 locale, said process comprising:

1        (a) energizing a laser to cause the selective emission  
2 of first radiation in a first wavelength range of 865 nm to  
3 875 nm and the selective emission of second radiation at a  
4 second wavelength range of 925 nm to 935 nm;

5        (b) establishing a path for the transmission of said  
6 first radiation and said second radiation from said laser  
7 oscillator sub-system; and

8        (c) enabling delivery of said first radiation and said  
9 second radiation from said laser oscillator sub-system  
10 through said optical channel to the site of said bacterial  
11 locale;

12        (d) said first radiation and said second radiation  
13 activating a chromophore from said bacterial locale and  
14 cooperating with said chromophore to destroy bacteria in  
15 said bacterial locale.

1        22. A process for destroying bacteria in a bacterial  
2 locale, said process comprising:

1           (a) energizing a laser to cause the selective emission  
2 of first radiation in the selected wavelength of 870nm and  
3 the selective emission of second radiation in the selective  
4 wavelength range of 930nm;

5           (b) establishing a path for the transmission of said  
6 first radiation and said second radiation from said laser  
7 oscillator sub-system; and

8           (c) enabling delivery of said first radiation and said  
9 second radiation from said laser oscillator sub-system  
10 through said optical channel to the site of said bacterial  
11 locale;

12           (d) said first radiation and said second radiation  
13 activating a chromophore from said bacterial locale and  
14 cooperating with said chromophore to cause a reaction with  
15 bacteria in said bacterial locale.

1           23. The process of claim 22 wherein said bacteria is  
2 E. coli.

1           24. The process of claim 22 wherein said reaction is a  
2 toxic singlet oxygen reaction.

1           25. A laser process comprising destroying bacteria in  
2 an infected locale by a reaction resulting from application  
3 to said infected locale of laser radiation, which is  
4 primarily of two wavelength ranges that are generated by a  
5 laser system:

6           (a) said bacteria including E. coli;

7 (b) said system comprising:

8 (1) a housing and a control;

9 (2) a laser oscillator sub-system within said housing  
 10 for causing the selective emission under said control of  
 11 first radiation that is primarily in a first wavelength  
 12 range of 865 nm to 875 nm, and the selective emission under  
 13 said control of second radiation at a second wavelength  
 14 range that is primarily in a wavelength range of 925 nm to  
 15 935 nm;

16 (3) an optical channel for transmission of said first  
 17 radiation and said second radiation from said laser  
 18 oscillator sub-system; and

19 (4) a head for enabling delivery of said first  
 20 radiation and said second radiation from said laser  
 21 oscillator sub-system through said optical channel to the  
 22 site of said bacterial locale;

23 (5) said first radiation and said second radiation  
 24 activating a chromophore from said bacterial locale and  
 25 cooperating with said chromophore to destroy said bacteria  
 26 in said bacterial locale.

1 26. A laser process comprising destroying bacteria in  
 2 an infected locale by a reaction resulting from application  
 3 to said infected locale of laser radiation, which is  
 4 primarily of two wavelength ranges that are generated by a  
 5 laser system, said system comprising:

6 (a) a housing and a control;

7 (b) a laser oscillator sub-system within said housing  
8 for causing the selective emission under said control of  
9 first radiation that is primarily in a first wavelength  
10 range of 865 nm to 875 nm, and the selective emission under  
11 said control of second radiation at a second wavelength  
12 range that is primarily in a wavelength range of 925 nm to  
13 935 nm;

14 (c) an optical channel for transmission of said first  
15 radiation and said second radiation from said laser  
16 oscillator sub-system; and

17 (d) a head for enabling delivery of said first  
18 radiation and said second radiation from said laser  
19 oscillator sub-system through said optical channel to the  
20 site of said bacterial locale;

21 (e) said first radiation and said second radiation  
22 activating a chromophore from said bacterial locale and  
23 cooperating with said chromophore to destroy said bacteria  
24 in said bacterial locale;

25 (f) said reaction being a toxic singlet oxygen  
26 reaction.

1 27. A dental process comprising scaling an infected  
2 locale and destroying bacteria in said infected locale by a  
3 reaction resulting from application to said infected locale  
4 of laser radiation, which is primarily of two wavelength

5 ranges that are generated by a laser system, said system  
6 comprising:

7 (a) a housing and a control, said system comprising a  
8 head that includes a dental scaler and an optical egress in  
9 close proximity;

10 (b) a laser oscillator sub-system within said housing  
11 for causing the selective emission under said control of  
12 first radiation that is primarily in a first wavelength  
13 range of 865 nm to 875 nm, and the selective emission under  
14 said control of second radiation at a second wavelength  
15 range that is primarily in a wavelength range of 925 nm to  
16 935 nm;

17 (c) an optical channel for transmission of said first  
18 radiation and said second radiation from said laser  
19 oscillator sub-system;

20 (d) said head enabling delivery of said first  
21 radiation and said second radiation from said laser  
22 oscillator sub-system through said optical channel to the  
23 site of said bacterial locale;

24 (e) said first radiation and said second radiation  
25 activating a chromophore from said bacterial locale and  
26 cooperating with said chromophore to destroy said bacteria  
27 in said bacterial locale; and

28 (f) said reaction being a toxic singlet oxygen  
29 reaction.



1           28. A dental process comprising:

2           (a) inserting a mechanical probe into an infected root  
3 canal to expose said root canal;

4           (b) removing said mechanical probe from said infected  
5 root canal;

6           (c) inserting an optical probe into said infected root  
7 canal to cause a reaction in bacteria in said infected root  
8 canal by transmission of laser radiation from said optical  
9 probe to bacteria in said infected root canal;

10          (d) said laser radiation consisting essentially of one  
11 or both of a first radiation and a second radiation, said  
12 first radiation being primarily in a first wavelength range  
13 of 865 nm to 875 nm, and said second radiation being  
14 primarily in a second wavelength range of 925 nm to 935 nm;

15          (e) said first radiation and/or said second radiation  
16 activating a chromophore in said bacterial locale and  
17 cooperating with said chromophore to destroy said bacteria;

18          (f) said reaction being a toxic singlet oxygen  
19 reaction;

20          (g) removing said optical probe from said root canal;  
21 and

22          (h) filling said root canal with a dental prosthesis.

1           29. The process of claim 28 wherein said bacteria is  
2 E. coli.

1           30. A therapeutic process comprising:

2 (a) inserting a diseased digital member into a clip  
3 having a pair of opposed elements;

4 (b) said opposed elements having optical egresses in  
5 communication with opposed sections of said digital member;

6 (c) causing a reaction in bacteria in said diseased  
7 digital member by transmission of laser radiation from said  
8 optical egresses to said bacteria;

9 (d) said laser radiation consisting essentially of one  
10 or both of a first radiation and a second radiation, said  
11 first radiation being primarily in a first wavelength range  
12 of 865 nm to 875 nm, and said second radiation being  
13 primarily in a second wavelength range of 925 nm to 935 nm;

14 (e) said first radiation and/or said second radiation  
15 activating a chromophore in said bacteria and cooperating  
16 with said chromophore to destroy said bacteria;

17 (f) said reaction being a toxic singlet oxygen  
18 reaction.

1 31. The process of claim 30 wherein said bacteria is  
2 E. coli.

1 32. A therapeutic process comprising:

2 (a) inserting an otoscope into an infected ear canal;

3 (b) said otoscope having an optical egress in  
4 communication with said ear canal;

5 (c) causing a reaction in bacteria in said infected  
6 ear canal by transmission of laser radiation from said  
7 optical egress to said bacteria;

8 (d) said laser radiation consisting essentially of one  
9 or both of a first radiation and a second radiation, said  
10 first radiation being primarily in a first wavelength range  
11 of 865 nm to 875 nm, and said second radiation being  
12 primarily in a second wavelength range of 925 nm to 935 nm;

13 (e) said first radiation and/or said second radiation  
14 activating a chromophore in said bacteria and cooperating  
15 with said chromophore to destroy said bacteria;

16 (f) said reaction being a toxic singlet oxygen  
17 reaction.

1 33. A therapeutic process comprising:

2 (a) subjecting a diseased anatomical local to laser  
3 radiation;

4 (b) causing a reaction in bacteria in said diseased  
5 locale by transmission of laser radiation to said bacteria;

6 (c) said laser radiation consisting essentially of one  
7 or both of a first radiation and a second radiation, said  
8 first radiation being primarily in a first wavelength range  
9 of 865 nm to 875 nm, and said second radiation being  
10 primarily in a second wavelength range of 925 nm to 935 nm;

11           (d) said first radiation and/or said second radiation  
12   activating a chromophore in said bacteria and cooperating  
13   with said chromophore to destroy said bacteria;  
14           (e) said reaction being a toxic singlet oxygen  
15   reaction.